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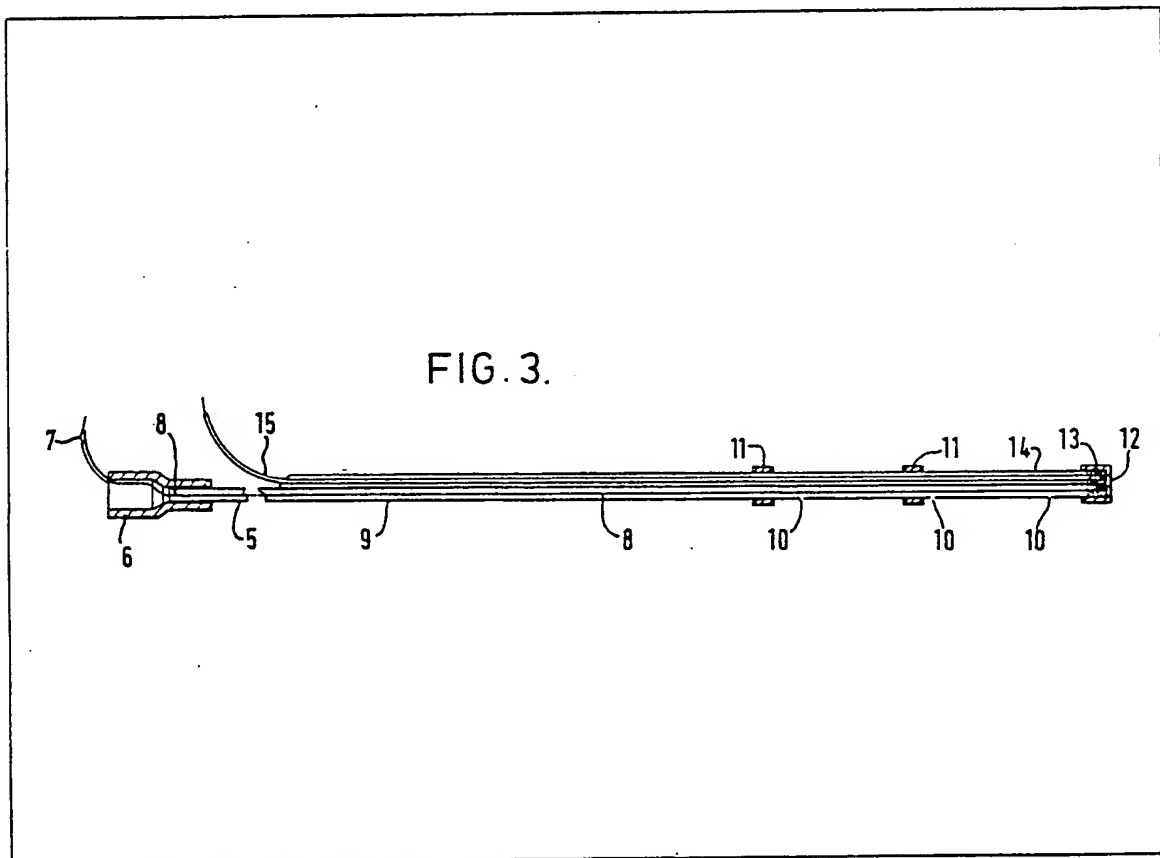
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provided with fluid discharge ori-  
 fices 10, the tube and duct having  
 an electrical resistance heating ele-  
 ment 8 extending therein. The duct  
 may be secured to a wiper blade or  
 arm by means of clips 11.

(54) Windscreen wash system  
 with electrical heating means

(57) A windscreen wash system for  
 attachment to a wiper blade or arm  
 or for use in association therewith  
 comprises a tube 5 connectable at  
 one end to a fluid reservoir by  
 means of connector 6, and a duct 9



The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1.

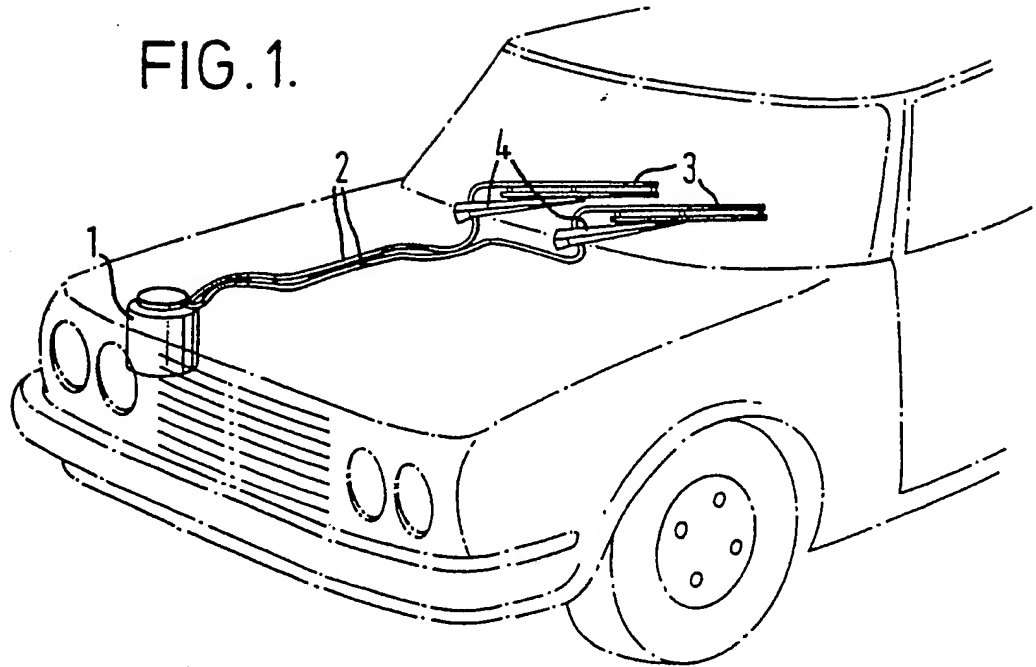


FIG. 2.

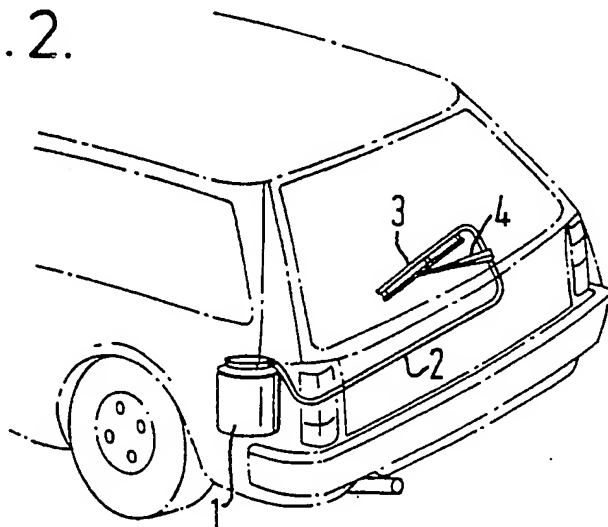


FIG. 3.

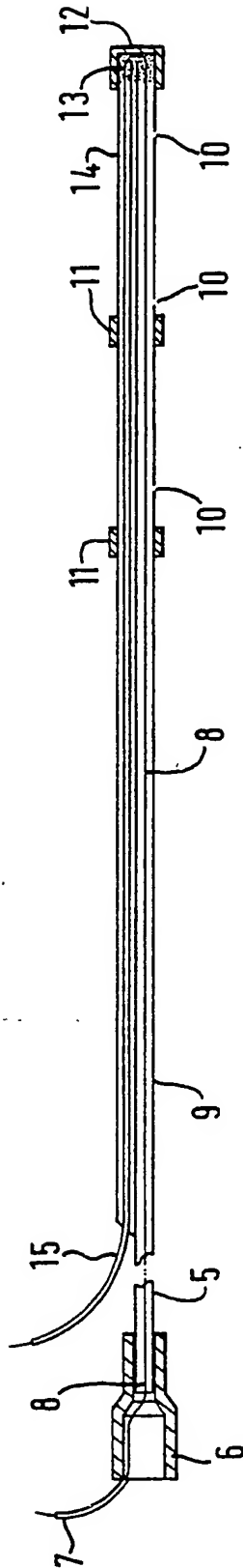


FIG. 4.

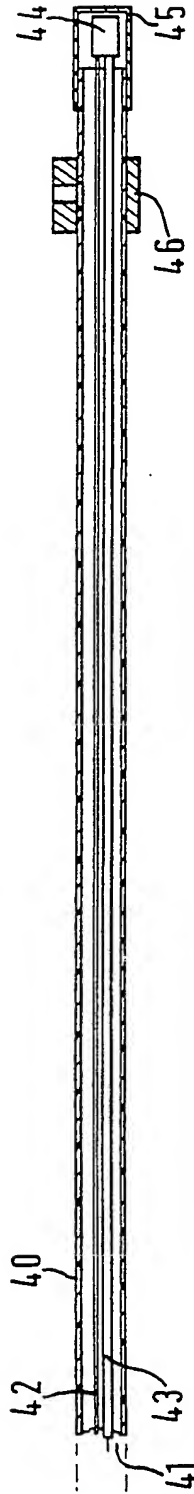


FIG. 5.

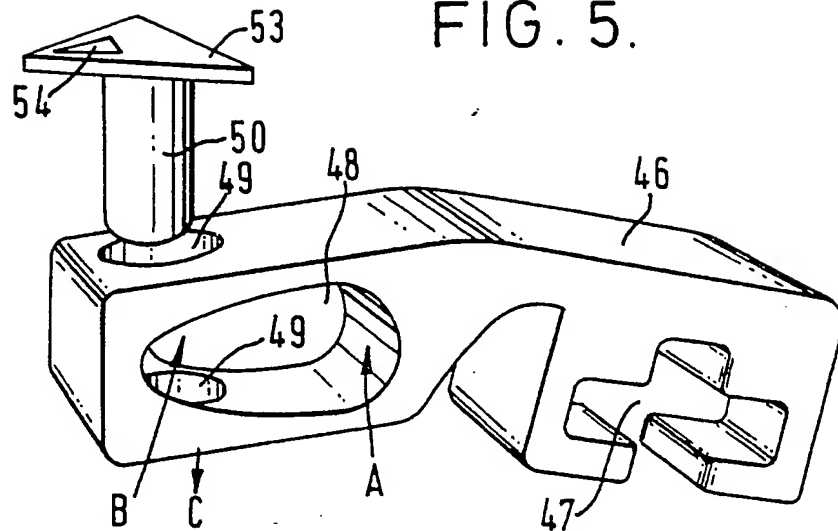


FIG. 6.

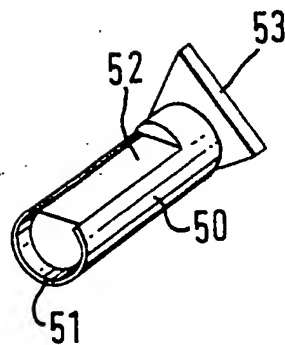
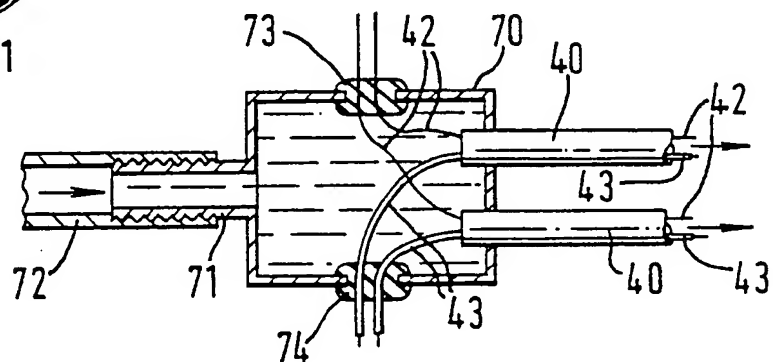


FIG. 7.



## SPECIFICATION

**Improvements in windscreen cleaning system for vehicles**

5 This invention relates to an improved windscreen cleaning system for vehicles and in particular to a system of delivering washing fluid to the windscreen to clean same in cooperation with the motion of the wiper blades thereover. In known arrangements liquid is directed to the windscreen as a spray and this is affected considerably by airflow making correct adjustment difficult for all vehicle speeds. The amount of liquid used is excessive in relation to actual requirements and several sweeps of the blades are normally needed to clear the screen. Attempts have been made to provide the actual blades with a liquid distribution duct so that discharge is made directly onto the windscreen. Such systems have not been successful, due in part to problems associated with damage and unworkability at below freezing temperatures. Also with known systems the liquid is discharged as a fine spray from a jet or jets along the blade, and this atomisation increases the tendency for the liquid spray to freeze even though temperatures may be above freezing.

30 It is an object of this invention to provide a system for delivering fluid to windscreens from the wiper arm assembly which overcomes the disadvantages rendering known systems unworkable in certain practical conditions.

35 According to this invention there is provided a windscreen cleaning system for vehicles comprising, for attachment to a windscreen wiper blade or arm or in combination therewith, a fluid duct having a portion with fluid discharge orifice positioned in proximity to the blade and communicating with a tubing portion for connection with a fluid supply and delivery means, the duct and tubing having an electric heating element extending therein.

45 The electric heating element will preferably comprise a single wire of a resistance enabling the ends of same to be connected to the vehicle electric supply, whereby a current is drawn sufficient to cause warming of the fluid to ensure its temperature is above freezing. Temperature control means may be provided, for example to control the current supplied according to external temperature. The resistive heating wire preferably extends from the fluid source or delivery pump to the wiper blade within the tubing and with suitable connector means bringing the wire ends out for electrical connection. The wiper blade end may conveniently have a twin or siamesed tube arranged so that the electrical connection is brought out from the duct and passes down the second tube by way of non-resistive wire to a suitable electrical grounding point on the vehicle.

The system according to the invention ensures that the fluid is heated along the length of the tube and up to the discharge orifices, thus avoiding freezing in the tubes or rapid thawing if frozen, and providing a temperature rise sufficient to avoid the spray freezing on passing through the air or when on the windscreen. The heating arrangement of the invention can be applied also to the tubing used in known discharge systems. In a preferred arrangement the orifices discharge onto the edge of the wiper blade in such a way that as the blade moves it carries before it a distributed wall of water.

80 Embodiments of the invention are shown by way of examples in the accompanying drawings wherein:-

*Figure 1* shows a typical installation for the front windscreen of a vehicle,

85 *Figure 2* shows a rear window installation, *Figure 3* shows a detail of the delivery ducting,

*Figure 4* shows a modified ducting,

90 *Figure 5* shows a ducting retaining clip and nozzle,

*Figure 6* shows a detail of the nozzle forming pin, and

*Figure 7* shows a fluid supply manifold and electrical terminal box.

95 Referring to Figs. 1 and 2, a typical installation is shown for front and rear washer systems comprising a fluid reservoir 1 with a pump means therein (not shown) and tubes 2 for delivering fluid to ducts 3 on the wiper blade arms 4.

100 Referring now to Fig. 3, a tube 5 of about 4 mm diameter internally has at its one end a connector 6 for attachment to the fluid outlet of a reservoir, the connector providing for the end 7 of a resistance wire 8 to pass there-through and to be connected to an electric supply. The wire 8 extends along the tube and through a duct 9 provided with fluid discharge orifices 10. The duct has clip means 11 by which it can be secured to a wiper blade carrier or to the wiper arm (not shown).

115 The end of the duct 8 is closed off by a cap 12 and sealant 13 and the resistance wire 8 passes there-through to continue through a second siamesed tube 14 as an electrical conductor 15 which may return to the reservoir end or preferably, as shown, be grounded near the wiper arm pivot point.

120 An embodiment used resistance wire of length 1.5 metres, and this had a current consumption of 1 Amp at 12 volts giving sufficient heating even under adverse temperature conditions. The fluid outlets were positioned close to the wiper blade. In the arrangement of Fig. 1 both tubes have the resistive heating elements as described.

125 An alternative embodiment, not shown but similar to that of Fig. 3, has the discharge orifices 10, together with the fluid duct 9,

formed as a part of the wiper blade moulding. The duct is supplied with fluid by the tube 5. In this case also, the wire element 8 continues through to the outer end of the wiper blade and is returned by means of a separate channel in the moulding, so as to make connection with the grounded electrical connector 15.

Fig. 4 shows a different and more convenient arrangement having a single flexible plastics tube 40 supplied with fluid from the end 41. The tube houses both the resistance wire 42 and the insulated return wire 43 with sufficient cross sectional area left for fluid flow. In this version both wires can, of course, contribute to the heating. The ends of the wires 42 and 43 are crimped at 44 to form a terminal with the tube closed by an end cap 45 or otherwise sealed.

The tube is secured to the wiper assembly by means of a clip 46 (Fig. 5) which also forms a fluid outlet nozzle. The clip has a profile 47 to be received over the wiper blade and runner and an oval aperture 48 through which tube 40 may pass. The dimensioning of the aperture 48 is arranged, in conjunction with tube 40 and the wires 42 and 43, so that the wires are deflected, when the tube is inserted, towards the zone A of the tube 40, thus leaving zone B of the deformed tube clear. A bore 49 in the clip 46 receives a pin 50 of which the end has a cutting lip 51 (Fig. 6) such that forcing the pin into the bore forms an incision in the side lobe of the tube. The pin has a flat side 52 which allows fluid to pass from the tube, through the duct defined by the flat side, to emerge in direction C. Thus a nozzle is formed at a selected point by appropriate positioning of the clip and insertion of the pin. The pin is rotated to adjust the nozzle size and the head 53 may have markings 54 thereon and be shaped to facilitate rotation.

Fig. 7 shows a connecting manifold comprising a fluid-tight box 70 with an inlet for fluid 71 connected to a supply pipe 72 and outlets to windscreen wipers comprising tubes 40, each with associated wires 42, 43. The wires are brought out of the box through seals 73, 74 and are appropriately connected to the vehicle electric system via control means.

#### CLAIMS

1. A windscreen cleaning system for vehicles comprising, for attachment to a windscreen wiper blade or arm or in combination therewith, a fluid duct having a portion with fluid discharge orifices positioned in proximity to the blade and communicating with a tubing portion for connection with a fluid supply and delivery means, the duct and tubing having an electric heating element extending therein.

2. A windscreen cleaning system for vehicles as claimed in Claim 1, wherein the electric heating element is a single wire of a resistance enabling the ends of same to be

connected across the vehicle electric supply whereby a current is drawn sufficient to cause warming of the fluid to ensure the temperature is maintained above freezing.

3. A windscreen cleaning system according to Claim 1 or 2, wherein a temperature control means is provided to control the current supplied according to external temperature.

4. A windscreen cleaning system in accordance with any preceding Claim, wherein the wire extends within the tubing from a fluid source or a fluid delivery pump to the wiper arm or blade.

5. A windscreen cleaning system in accordance with any preceding Claim, wherein the part for mounting on a wiper blade end has a twin or siamesed tube, the electrical connection being brought out from the duct formed by one tube and passing down the second tube by way of a non-resistive wire to a suitable electrical grounding point on the vehicle.

6. A windscreen cleaning system in accordance with any preceding Claim, wherein the orifices discharge onto the edge of the wiper blade in such a way that as the blade moves it carries before it a distributed wall of water.

7. A windscreen cleaning system, wherein the duct is secured to the windscreen wiper arms and/or blades by clips.

8. A windscreen cleaning system according to Claim 7, wherein the clips have apertures to receive the tubing forming the duct, each aperture having a transverse bore to the side thereof, pin having a sharp edged end for insertion into the bore to puncture the tubing and to form a fluid outlet nozzle.

9. A windscreen cleaning system according to Claim 8, wherein the aperture is of oval shape the radius of curvature of the side adjacent the bore being less than the radius of curvature of the opposed side of the aperture.

10. A windscreen cleaning system according to any preceding Claim, wherein the resistance wire extends along the tubing forming the duct to an end where a connection is made to a non-resistive insulated wire which extends back along the tubing.

11. A windscreen cleaning system in accordance with any preceding Claim, wherein a coupling box is provided for connection with the fluid supply, the box being fluid-tight with electrical connections passing therethrough.

12. A windscreen wiping system substantially as described herein with reference to the accompanying drawings.